

Preliminary Amendment
Application No.: 10/820,024
Reply to Office Action dated September 25, 2006
March 26, 2007

REMARKS

By this amendment, claim 6 has been cancelled, claims 3, 12, 14-17 and 26-34 have been amended and new claims 35-39 have been added in the application. Currently, claims 3, 5, 7, 9-39 are pending in the application.

Examiner Tsoy is thanked for the courtesies extended to the undersigned and Mr. Iijima, Mr. Abe and Mr. Uno during the personal interview on December 7, 2006. During the interview, applicants' representatives discussed the process steps of making the electroless plating powder of the present invention and the differences with the process steps of Weber et al. and also discussed some photographs showing the columnar structures of the present invention. It was also pointed out that the method of the present invention included adding a first solution containing the nickel ion-containing solution and the complexing solution with a second solution containing the reducing agent-containing solution, to the aqueous solution, individually and simultaneously. Examiner Tsoy suggested that applicants amend their claims to include this feature. Examiner Tsoy also suggested that applicants prepare a Declaration using the core particles of the present invention and then apply the steps of Weber et al. to make a Ni coating on the core particles because

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she felt that Weber et al.'s method should result in a coated product having columnar structures. The following comments were included in the Interview Summary paper handed to applicants' representative: "Discussed possibilities of overcoming Weber by filing Declaration showing that a method of Weber does not achieve columnar structure of Ni coating. Applicants will amend claim 3 to clarify differences between prior art method and theirs."

Following the interview, the applicants conducted a series of tests as suggested by Examiner Tsoy. These experiments have been detailed in the attached Declaration under 37 CFR 1.132 signed by Mr. Shinji Abe, one of the inventors of the present invention. This Declaration and the accompanying color (and black and white) pictures (one set of each) show that when the Weber et al. process is applied to the core particles using several different conditions, no continuous Ni metal coating was obtained. Further, no columnar structure was found in any of the examples using the Weber et al. process. It is therefore believed that in view of the amendments to the claims and the attached Declaration, that the claims in this application are allowable over the prior art of record.

The points raised in the previous office action are now discussed in order, prior to discussing the prior art rejections.

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Claims 16, 33 and 34 were objected to because the phrase "electroless plating powder" in claims 16, 33 and 34 should be changed to "electroless plated powder" and "forming a gold plating layer" in claims 33 and 34 should be changed to "forming a gold plated layer". By this amendment, claims 16, 33 and 34 have been amended as suggested by the Examiner. It is respectfully requested that these claim objections be withdrawn in view of these amendments.

Claim 3 was rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of U.S. Patent No. 6,770,369 in view of Weber et al. By this amendment, applicants hereby submit the enclosed Terminal Disclaimer to Obviate a Double Patenting Rejection Over Prior Patent. It is respectfully submitted that this rejection should be withdrawn in view of the submission of this Terminal Disclaimer.

Claims 3, 7, 10-11, 14-24 and 27-34 were rejected under 35 USC 103(a) as being obvious over Weber et al. Also, claims 4-6, 9, 12-24 and 27-32 were rejected under 35 USC 103(a) as being obvious over Weber et al. in view of Henry et al. (U.S. Patent No. 6,156,390). Claims 25-26 were rejected under 35 USC 103(a) as being obvious over Weber et al./Weber et al. in view of Henry et al./ in view of Vincent et al. (U.S. Patent No. 3,489,576).

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Claims 33-34 were rejected under 35 USC 103(a) as being obvious over Weber et al. in view of Filas et al. (U.S. Patent No. 5,380,559).

These rejections are respectfully traversed in view of the amendments to the independent claims 3, 16, 33 and 34 including those claim features suggested by the Examiner, the enclosed Declaration under 37 CFR 1.132 showing the differences with the prior art to Weber et al. as requested by the Examiner and the remarks below.

The present invention relates to a conductive electroless plated powder and a method for making the same. More particularly, the present invention relates to a conductive electroless plated powder provided with nickel films having improved heat resistance (see page 1, lines 7-11 of the specification).

In the nickel film of the plated powder of the present invention, many columnar structures extending in the direction of the thickness gather tightly to form a dense, homogeneous, and continuous film as shown in Fig. 1. On the other hand, in the nickel film of the conventional plated powder shown in Fig. 2, crystal grains are rough and heterogeneous. The present inventors have found that, in the nickel film having the columnar structures as shown in Fig. 1, heat resistance is high, and the

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conductivity of the plated powder is not easily decreased even under high temperature conditions (see page 5, lines 9-19 of the specification).

The present invention discloses that it is important to involve a complexing agent in the initial thin film-forming solution. By incorporating the complexing agent in the initial thin film-forming solution and by incorporating the complexing agent in the nickel ion-containing solution, it is possible to easily form a nickel film having columnar structures. From this viewpoint and from the viewpoint of the solubility of the complexing agent, the amount of the complexing agent in the initial thin film-forming solution is preferably 0.003 to 10 moles/l and more preferably 0.006 to 4 moles/l (see page 12, line 20 - page 13, line 14 of the specification).

By this amendment, independent claim 3 has been amended to recite the step of "adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating so that columnar

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structures extending in a direction of a thickness of a nickel film are formed".

By this amendment, independent claim 16 has been amended to recite the step of "adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating".

By this amendment, independent claim 33 has been amended to recite the step of "adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating so that columnar structures extending in a direction of a thickness of a nickel film are formed" and "forming a gold plated layer as a top layer on the nickel film".

By this amendment, independent claim 34 has been amended to recite the step of "adding a first solution, which contains a

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nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating" and "forming a gold plated layer as a top layer on the nickel film."

These features are not shown or suggested by Weber et al., Henry et al., Vincent et al. and Filas et al. or any combination of these references.

Weber et al. relate to a substrate, a method of nucleation, a powder, and a method for metal plating (see column 1, lines 6-7). Glass substrates in the form of plates of glass or glass powder are nucleated with palladium and then coated with a layer of nickel/tungsten (see column 3, lines 49-52).

Weber et al. also disclose that to apply a layer of nickel/tungsten alloy to the nucleated glass powder, the powder is exposed to an aqueous solution containing a tungsten salt, preferably a tungstate, a nickel salt, preferably nickel sulfate, and a reducing agent such as a dialkylaminoborane and optionally other additives such as a wetting agent (see column 4, line 40-45).

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Weber et al. do not disclose adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating so that columnar structures extending in a direction of a thickness of a nickel film are formed as claimed in independent claim 3.

Weber et al. do not disclose adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating as claimed in independent claim 16.

Weber et al. do not disclose adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the

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complexing agent to perform electroless plating so that columnar structures extending in a direction of a thickness of a nickel film are formed and forming a gold plated layer as a top layer on the nickel film as claimed in independent claim 33.

Weber et al. do not disclose adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating and forming a gold plated layer as a top layer on the nickel film. as claimed in independent claim 34.

For these reasons, it is believed that Weber et al. do not show or suggest the present claimed features of the present invention. Applicants also submit that Henry et al., Vincent et al. and Filas et al. do not make up for the deficiencies in Weber et al.

Henry et al. relate to metal plating and more particularly to the co-deposition of fluorinate carbon and a diamond-containing material with electroless metal platings (see column 1, lines 5-7).

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Henry et al. disclose that it is preferred that the electroless nickel bath be formulated separately with the reducing agent and the complexing agent. To the electroless metal bath is then added the suspension of the fluorinated carbon and the diamond-containing material in the appropriate proportions. The amount of the reducing agent is not critical and can likewise be varied within wide ranges. Typically, the reducing agent may be present in amounts ranging from 20 to 200 grams per liter. (see column 5, lines 16-24).

Henry et al., Vincent et al. and Filas et al. do not disclose adding a first solution, which contains a nickel ion-containing solution and the complexing agent, and a second solution, which contains a reducing agent-containing solution, to the aqueous suspension individually and simultaneously, the aqueous suspension containing the core particles provided with the initial thin nickel films and the complexing agent to perform electroless plating so that columnar structures extending in a direction of a thickness of a nickel film are formed as claimed in independent claim 3 and similarly claimed in claims 16, 33 and 34.

It is therefore respectfully submitted that Weber et al., Henry et al., Vincent et al. and Filas et al., individually or in combination, do not teach, disclose or suggest the presently


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claimed invention and it would not have been obvious to one of ordinary skill in the art to combine these references to render the present claims obvious.

In view of foregoing claim amendments and remarks, it is respectfully submitted that the application is now in condition for allowance and an action to this effect is respectfully requested.

If there are any questions or concerns regarding the amendments or these remarks, the Examiner is requested to telephone the undersigned at the telephone number listed below.

Respectfully submitted,


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